

may feel pain in the toes that he no longer possesses, if action in the brain should reproduce twinges that he associated with his toes before his leg was amputated. Our physical sufferings are then, so to speak, all mental, and we locate them in various parts of the body by inferences which are deceptive but are very useful. Pain that arises directly in the brain, in conditions of mental hallucination, may be as acute as when a bodily organ is physically affected. We should, then, think of sensations as created by the brain, not by the organs of sense; in this respect they resemble memories or hallucinations. Sensations are generally more vivid than memories. But we may at times be at a loss to decide whether a brain picture comes from the outside, or arises, as a vision, within us.

In the higher animals a sensory apparatus consists, in the first place, of some peculiarly modified tissue on the exterior surface of the body, specially adapted for the reception of outside impressions. Such are the rods and cones of the retina of the eye, the Cortian fibres which line the inner passages of the ear, and the nerve endings by which we gather the impressions of touch and taste. Secondly, it includes a nerve system by which the impression is transmitted to a point where it is converted into an impulse that lies outward to actuate a muscle. In its essential form this system consists of a sensory,

or " afferent " nerve, a ganglion, in which this nerve ends, and a motor or " efferent " nerve proceeding from the ganglion to a muscle. By biologists of a materialistic way of thinking, the afferent nerve is pictured as causing a chemical reaction, or explosion, in the ganglion, and as in this manner setting free energy which is stored in the ganglion. But it may also be pictured as